

IN THE CLAIMS:

Please cancel Claim 30 without prejudice to or disclaimer of the subject matter presented therein.

Please amend Claims 1-29 and 31-38 as follows.

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1. (Currently Amended) ~~A stereoscopic image displaying method, wherein, when image information displayed on an image displaying device is observed three-dimensionally by guiding display light from an image corresponding to a viewpoint of one parallax image on said image displaying device, on which parallax images corresponding to a plurality of different viewpoints can be displayed, to a light transmitting section and a light shielding section formed within an optical modulator, by a second optical system, and collecting the display light transmitted through said light transmitting section of said optical modulator at a position, which is a predetermined distance apart, corresponding to the viewpoint on an observation surface, by a first optical system, the entire screen of a parallax image to be displayed on said image displaying device is caused to be incident on each eye by controlling transmitted light from said optical modulator in synchronism with the switching of parallax images to be displayed on said image displaying device~~ A stereoscopic image displaying apparatus comprising:

an image displaying device for displaying parallax images corresponding to a plurality of different viewpoints;

an optical modulator having a light transmitting section and a light shielding section;

a first optical system for guiding a display light transmitted through the

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transmitting section of said optical modulator to a predetermined position on an observation surface which is a predetermined distance apart from said optical modulator;  
and

a second optical system for guiding the display light from said image displaying device onto the light transmitting section and the light shielding section of said optical modulator, wherein

a position of the light transmitting section formed on said optical modulator is controlled so as to be synchronized with a switchover timing of the parallax images displayed by said image displaying device so that the substantial entirety of the parallax images displayed by said image displaying device becomes observable on the observation surface.

2. (Currently Amended) ~~A stereoscopic image displaying method according to claim 1, wherein~~

~~a first synthesized parallax image in which one stripe image is synthesized by dividing two parallax images for the right and the left eyes to horizontal stripe pixels, respectively, and arranging horizontal stripe pixels for the left and the right eyes in a predetermined order, and a second synthesized parallax image that is an interpolation image of said first synthesized parallax image which is synthesized by changing its order of arrangement are alternately displayed on said image displaying device~~ A stereoscopic image displaying apparatus according to Claim 1, wherein said image displaying device alternately displays a first synthesized parallax image and a second synthesized parallax image.

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the first synthesized parallax image being obtained by alternately and perpendicularly arranging in a predetermined order horizontal stripe images for the right and the left eyes which are formed by dividing the parallax image the for the right eye and the parallax image for the left eye respectively, the second synthesized parallax image being obtained by alternately and perpendicularly arranging horizontal stripe images for the right and the left eyes in an order that is the reverse of said predetermined order.

3. (Currently Amended) ~~A stereoscopic image displaying method according to claim 2, wherein~~

~~the changes of said synthesized parallax image to be displayed on said image displaying device and the control for forming said light transmitting section and said light shielding section are performed synchronously for each pixel of said image displaying device or each scan line~~ A stereoscopic image displaying apparatus according to Claim 2, wherein a switchover of the parallax images displayed on said image displaying device and a switchover of the position of the light transmitting section formed on said optical modulator are controlled so as to be synchronized with a switchover of each pixel on said image displaying device.

4. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 1, 2 or 3, wherein

said optical modulator uses a liquid crystal shutter that has pixels of a matrix structure or an oblong pixel structure.

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5. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 1, wherein

two parallax images for the right and the left eyes are alternately displayed on said image displaying device.

6. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 1, wherein

said image displaying device emits predetermined polarized light.

7. (Currently Amended) ~~A stereoscopic image displaying method according to claim 6, wherein~~

~~said optical modulator has a first phase shift member for giving two different phase shift states to transmitted light by an electric signal and a polarized optical device for partially transmitting predetermined polarized light only which is provided in a predetermined position to the front of said first phase shift member~~ A stereoscopic image displaying apparatus according to Claim 6, wherein said optical modulator comprises:

a first phase shift member for giving two different phase shift states to transmitted light by an electric signal, and

a polarized optical element having a part for transmitting only predetermined polarized light among light transmitted through said first phase shift member.

8. (Currently Amended) ~~A stereoscopic image displaying method according to claim 7, wherein~~

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~~said polarized optical device configured by arranging two polarization plates~~  
on which optical axes are perpendicular to each other in a checkered position A  
stereoscopic image displaying apparatus according to Claim 7, wherein said first phase  
shift member is arranged between said image displaying device and said second optical  
system.

9. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus  
according to Claim 7, wherein

said polarized optical ~~device~~ element is configured by alternately arranging  
two polarization plates on which optical axes are perpendicular to each other in the  
horizontal direction in a stripe pattern that is long in the vertical direction.

10. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus  
according to Claim 7, 8, or 9, wherein

said polarized optical ~~device~~ element comprises a second phase shift member  
and a polarizing plate, and its phase is processed as 0 and  $\pi$  in a pattern in which said  
second phase shift member is arranged in a checkered pattern or a stripe pattern that is long  
in the vertical direction.

11. (Currently Amended) ~~A stereoscopic image displaying method according~~  
~~to claim 6, wherein~~

~~said optical modulator has a first phase shift member for giving two different~~  
~~phase shift states to transmitted light by an electric signal, and said first shift member is~~

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arranged between said image displaying device and said second optical system A  
stereoscopic image displaying apparatus according to Claim 7, 8, or 9, wherein, said  
polarized optical element comprises:

a second phase shift member having a region providing  $\pi$  phase shift on the  
transmitted light and a region providing no phase shift on the transmitted light, and  
a polarized plate having one polarized direction.

12. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus  
according to Claim 6, wherein

said image displaying device has an automatic light emission display apparatus  
and a polarizing plate.

13. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus  
according to Claim 1, wherein said image displaying device displays an image having no  
parallax on the entire or partial surface thereof.

~~a 2D image (an image without parallax) is displayed on a part of or the entirety~~  
~~of said image displaying device.~~

14. (Currently Amended) ~~A stereoscopic image displaying method according~~  
~~to claim 1, wherein~~

~~said second optical system focuses an image of said image displaying device~~  
~~on a plane within said modulator on which said light transmitting section and said light~~  
~~shielding section are formed in the vertical direction, and a focal point position of said~~

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~~second optical system and the position of said plane within said optical modulator~~  
~~substantially coincide with each other in the horizontal direction~~ A stereoscopic image  
displaying apparatus according to Claim 1, wherein said second optical system  
substantially focuses, in the perpendicular direction, light from said image displaying  
device on the surface on which the light transmitting section and the light shielding section  
are formed by said optical modulator, and sets, in the horizontal direction, the surface on  
which the light transmitting section and the light shielding section are formed by said  
optical modulator as a substantial focal point position.

15. (Currently Amended) A stereoscopic image displaying method apparatus  
according to Claim 1, wherein said first optical system and said second optical system have  
predetermined periodic structures in the horizontal direction, and are disposed so that  
centers of each optical element forming each of said first and said second optical system  
substantially coincide with an intersection point of straight lines which respectively  
connect positions of a right and left pupil of an observer and positions of each pixel on said  
image displaying device.

~~said first optical system and said second optical system have predetermined~~  
~~periodic structures in the horizontal direction, and said second optical system and/or said~~  
~~image displaying device are disposed on a face on which a multiplicity of straight lines~~  
~~cross, which connect the left and the right pupils and the center in the horizontal direction~~  
~~of each optical element forming said first optical system.~~

16. (Currently Amended) A stereoscopic image displaying method apparatus

according to Claim 1, wherein

said second optical system has a predetermined periodic structure in the horizontal and vertical directions, respectively, and ~~said~~ an optical element forming one period in the horizontal and vertical directions has optical actions that are different in the horizontal direction and the vertical direction.

17. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 1, wherein said first optical system and said second optical system are disposed so that centers of each optical element forming each of said first and said second optical system substantially coincide with an intersection point of straight lines which respectively connect positions of a right and left pupil of an observer and positions of each pixel on said image displaying device.

~~a crossing point of a multiplicity of straight lines that connect the left and the right pupils and the center in the horizontal direction of each optical element forming said first optical system, and the center in the horizontal direction of each optical device forming said second optical system coincide with each other, and/or the center in the horizontal direction of pixels forming said image displaying device coincide with them.~~

18. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to any one of Claims 1, 2, 3 and 5, wherein

when the left and the right pupils are apart by an interval E, a period in the horizontal direction of ~~said~~ the optical element forming said first optical system is HL1, a width in the horizontal direction of ~~said~~ the light transmitting section of said optical



modulator is  $H_m$ , a period in the horizontal direction of ~~said~~ the optical element forming said second optical system is  $HL_2$ , a pixel pitch in the horizontal direction of said image displaying device is  $H_d$ , optical distances between said first optical system and said second optical system and said first optical system and said image displaying device are  $L_{hL2}$  and  $L_{hd}$ , respectively, an optical distance from the observation surface to said first optical system is  $L_{h0}$ , an optical distance between said first optical system and from a crossing face light beam intersecting plane that is the first one counted from said first optical system in the direction to said image displaying device among faces light beam intersecting planes on which ~~a group of light beams~~ each beam connecting the left and the right pupils and each pixel of said image displaying device ~~cross~~ crosses is  $L_{h1}$ , an optical distance from said first optical system to a plane within said optical modulator on which ~~said~~ the light transmitting section and ~~said~~ the light shielding section are formed is  $L_{h1a}$ , an optical distance from ~~said~~ the plane within said optical modulator to a crossing face light beam intersecting plane that is the first one counted from said first optical system in the direction to said image displaying device is  $L_{h1b}$ , and both  $N_d$  and  $N_{L2}$  are integral numbers of 2 or more, the following ~~relation is~~ relations are realized:

$$N_d * HL_1 / E = L_{hd} / (L_{hd} + L_{h0}) \dots (h1)$$

$$H_d / HL_1 = (L_{h0} + L_{hd}) / L_{h0} \dots (h2)$$

$$N_{L2} * HL_1 / E = L_{hL2} / (L_{hL2} + L_{h0}) \dots (h3)$$

$$HL_2 / HL_1 = (L_{h0} + L_{hL2}) / L_{h0} \dots (h4)$$

$$H_1 / E = L_{h1} / (L_{h1} + L_{h0}) \dots (h5)$$

$$H_1 / HL_1 = (L_{h1} + L_{h0}) / L_{h0} \dots (h6)$$

$$H_1 * L_{h1a} / L_{h1} = HL_1 * L_{h1b} / L_{h1} \dots (h7)$$

$$Lh1a+Lh1b=Lh1 \dots (h8)$$

$$Hm/H1=Lh1a/Lh1 \dots (h9)$$

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19. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 4, wherein

when the left and the right pupils are apart by an interval E, a period in the horizontal direction of ~~said~~ the optical element forming said first optical system is HL1, a width in the horizontal direction of ~~said~~ the light transmitting section of said optical modulator is Hm, a period in the horizontal direction of ~~said~~ the optical element forming said second optical system is HL2, a pixel pitch in the horizontal direction of said image displaying device is Hd, optical distances between said first optical system and said second optical system and said first optical system and said image displaying device are LhL2 and Lhd, respectively, an optical distance from the observation surface to said first optical system is Lh0, an optical distance between said first optical system and from a crossing face light beam intersecting plane that is the first one counted from said first optical system in the direction to said image displaying device among ~~faces~~ light beam intersecting planes on which ~~a group of light beams~~ each beam connecting the left and the right pupils and each pixel of said image displaying device ~~cross~~ crosses is Lh1, an optical distance from said first optical system to a plane within said optical modulator on which ~~said~~ the light transmitting section and ~~said~~ the light shielding section are formed is Lh1a, an optical distance from ~~said~~ the plane within said optical modulator to a ~~crossing-face~~ light beam intersecting plane that is the first one counted from said first optical system in the direction to said image displaying device is Lh1b, and both Nd and NL2 are integral numbers of 2 or

more, the following ~~relation is~~ relations are realized:

$$Nd*HL1/E=Lhd/(Ldh+Lh0) \dots (h1)$$

$$Hd/HL1=(Lh0+Lhd)/Lh0 \dots (h2)$$

$$NL2*HL1/E=LhL2/(LhL2+Lh0) \dots (h3)$$

$$HL2/HL1=(LhO+LhL2)/LhO \dots (h4)$$

$$Hl/E=Lh1/(Lh1+Lh0) \dots (h5)$$

$$H1/HL1=(Lh1+Lh0)/Lh0 \dots (h6)$$

$$Hl*Lh1a/Lh1=HL1*Lh1b/Lh1 \dots (h7)$$

$$Lh1a+Lh1b=Lh1 \dots (h8)$$

$$Hm/H1=Lh1a/Lh1 \dots (h9)$$

20. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to any one of Claims 1, 2, 3 and 5, wherein

when a pixel pitch in the vertical direction of said image displaying device is  $V_d$ , a width in the vertical direction of ~~said the~~ light transmitting section or ~~said the~~ light shielding section of said optical modulator is  $V_m$ , an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is  $L_{v1}$ , an optical distance from a face having optical actions in the vertical direction of said second optical system to said a plane within said optical modulator on which ~~said the~~ light transmitting section and ~~said the~~ light shielding section are formed is  $L_{v2}$ , a focal distance in the vertical direction of each optical element forming said second optical system is  $f_v$ , and an optical distance between ~~said the~~ plane within said optical modulator and an observation surface is  $L_{v0}$ , the following ~~relation is~~ relations are

realized:

$$Vd:Vm=Lv1:Lv2 \dots (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \dots (v2)$$

$$1/Lv1+1/Lv2=1/fv \dots (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \dots (v4)$$

21. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 4, wherein

when a pixel pitch in the vertical direction of said image displaying device is  $Vd$ , a width in the vertical direction of ~~said the~~ light transmitting section or ~~said the~~ light shielding section of said optical modulator is  $Vm$ , an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is  $Lv1$ , an optical distance from a face having optical actions in the vertical direction of said second optical system to a plane within said optical modulator on which ~~said the~~ light transmitting section and ~~said the~~ light shielding section are formed is  $Lv2$ , a focal distance in the vertical direction of each optical element forming said second optical system is  $fv$ , and an optical distance between ~~said the~~ plane within said optical modulator and an observation surface is  $Lv0$ , the following ~~relation is~~ relations are realized:

$$Vd:Vm=Lv1:Lv2 \dots (v1)$$

$$2 \cdot Vd:VL=Lv1+Lv2:Lv2 \dots (v2)$$

$$1/Lv1+1/Lv2=1/fv \dots (v3)$$

$$Vd:VL=Lv0+Lv1+Lv2:Lv0+Lv2 \dots (v4)$$

22. (Currently Amended) A stereoscopic image displaying method apparatus according to Claim 18, wherein

when a pixel pitch in the vertical direction of said image displaying device is  $V_d$ , a width in the vertical direction of ~~said the~~ light transmitting section or ~~said the~~ light shielding section of said optical modulator is  $V_m$ , an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second optical system is  $L_{v1}$ , an optical distance from a face having optical actions in the vertical direction of said second optical system to a plane within said optical modulator on which ~~said the~~ light transmitting section and ~~said the~~ light shielding section are formed is  $L_{v2}$ , a focal distance in the vertical direction of each optical element forming said second optical system is  $f_v$ , and an optical distance between ~~said the~~ plane within said optical modulator and an observation surface is  $L_{v0}$ , the following ~~relation is~~ relations are realized:

$$V_d:V_m=L_{v1}:L_{v2} \dots (v1)$$

$$2 \cdot V_d:V_L=L_{v1}+L_{v2}:L_{v2} \dots (v2)$$

$$1/L_{v1}+1/L_{v2}=1/f_v \dots (v3)$$

$$V_d:V_L=L_{v0}+L_{v1}+L_{v2}:L_{v0}+L_{v2} \dots (v4)$$

23. (Currently Amended) A stereoscopic image displaying method apparatus according to Claim 19, wherein

when a pixel pitch in the vertical direction of said image displaying device is  $V_d$ , a width in the vertical direction of ~~said the~~ light transmitting section or ~~said the~~ light shielding section of said optical modulator is  $V_m$ , an optical distance from said image displaying device to a face having optical actions in the vertical direction of said second

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optical system is  $L_{v1}$ , an optical distance from a face having optical actions in the vertical direction of said second optical system to a plane within said optical modulator on which ~~said the~~ light transmitting section and ~~said the~~ light shielding section are formed is  $L_{v2}$ , a focal distance in the vertical direction of each optical element forming said second optical system is  $f_v$ , and an optical distance between ~~said the~~ plane within said optical modulator and an observation surface is  $L_{v0}$ , the following ~~relation is~~ relations are realized:

$$V_d:V_m=L_{v1}:L_{v2} \dots (v1)$$

$$2 \cdot V_d:V_L=L_{v1}+L_{v2}:L_{v2} \dots (v2)$$

$$1/L_{v1}+1/L_{v2}=1/f_v \dots (v3)$$

$$V_d:V_L=L_{v0}+L_{v1}+L_{v2}:L_{v0}+L_{v2} \dots (v4)$$

24. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to any one of Claims ~~1 through 3, 5 through 9 and 11 through 17~~ 1-3, 5-9, 12-17, wherein

said first and said second optical systems have lenticular lenses.

25. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 4, wherein

said first and said second optical systems have lenticular lenses.

26. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim ~~10~~ 11, wherein

said first and said second optical systems have lenticular lenses.

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27. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 18, wherein

said first and said second optical systems have lenticular lenses.

28. (Currently Amended) A stereoscopic image displaying ~~method~~ apparatus according to Claim 19, wherein

said first and said second optical systems have lenticular lenses.

29. (Currently Amended) ~~A stereoscopic image displaying method, wherein each of parallax images corresponding to a plurality of different viewpoints is made a predetermined stripe image, display light, which is from a stripe image corresponding to one viewpoint of a synthesized parallax image on an image displaying device that can alternately display a synthesized parallax image in which the stripe images is arranged in a predetermined order and synthesized and a synthesized parallax image in which the arrangement is changed, is guided by a second optical system to a light transmitting section and a light shielding section which are formed on a plane within an optical modulator and are capable of changing over in synchronism with the change of a synthesized parallax image, display light that has transmitted through said light transmitting section of said optical modulator are collected at a position corresponding to a viewpoint on an observation face by a first optical system, and stereoscopic observation of image information displayed on said image displaying device is thereby performed~~ A stereoscopic image displaying apparatus comprising:

an image displaying device for respectively making parallax images which

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correspond to a plurality of different viewpoints from predetermined stripe images, and  
displaying a synthesized parallax image obtained by arranging the stripe images in a  
predetermined order and synthesizing the arranged stripe images;

an optical modulator for forming a light transmitting section and a light  
shielding section;

a first optical system for guiding a display light transmitted through the  
transmitting section of said optical modulator to positions on an observation surface which  
correspond to the plurality of different viewpoints; and

a second optical system for guiding the display light from said image  
displaying device onto the light transmitting section and the light shielding section of said  
optical modulator, wherein

a switchover of an arrangement order of the stripe images when the  
synthesized image displayed on said image displaying device is synthesized is controlled  
so as to be synchronized with a position of the light transmitting section formed on said  
optical modulator.

30. (Cancelled)

31. (Currently Amended) ~~A stereoscopic image displaying method according~~  
~~to claim 29 or 30, wherein~~

~~said second optical system forms an image of said image displaying device on~~  
~~said plane on which said light transmitting section and said light shielding section are~~  
~~formed in the vertical direction, and a focal point position and the position of said plane~~



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~~within said optical modulator substantially coincide with each other in the horizontal direction~~ A stereoscopic image displaying apparatus according to Claim 29, wherein said second optical system substantially focuses, in the perpendicular direction, light from said image displaying device on the surface on which the light transmitting section and the light shielding section are formed by said optical modulator, and sets, in the horizontal direction, the surface on which the light transmitting section and the light shielding section are formed by said optical modulator as a substantial focal point position.

32. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to any one of claims 1 through 3, 5 through 9 and 11 through 17 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to any one of Claims 1-3, 5-9, and 12-17.

33. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 4 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 4.

34. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 10 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 11.

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35. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 18 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 18.

36. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 19 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 19.

37. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to any one of claim 29 or 30 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 29.

38. (Currently Amended) ~~A stereoscopic image displaying apparatus, wherein a stereoscopic image displaying method according to claim 31 is used~~ A stereoscopic image display method for providing a stereoscopic image to an observer by using a stereoscopic image displaying apparatus according to Claim 31.

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